What is claimed is:

1. A dryer bar apparatus of a dryer for drying a web in a papermaking machine, said apparatus comprising:

a rotatable dryer shell of cylindrical configuration, said dryer shell having an outer surface for drying the web;

said dryer shell having an inner surface which defines an enclosure, said inner surface having a radius R_i;

said enclosure being connected to a source of pressurized steam such that in operation of the dryer, a transfer of thermal energy from the steam within said enclosure through said inner surface of said dryer shell to said outer surface of said dryer shell is achieved so that the web is dried;

a syphon disposed within said enclosure for controlling a layer of condensed steam accumulating adjacent to said inner surface of said dryer shell during operation of said apparatus;

a number of turbulance bars disposed within said enclosure, each of said turbulance bars

extending in a cross machine direction in contact with said inner surface, said bars being circumferentially spaced equidistantly around said inner surface of said dryer shell for generating turbulance within said layer so that uniformity of said transfer of thermal energy in said cross machine direction is maximized while said transfer of thermal energy through said dryer shell from said inner to said outer surface is minimized; and

said number of turbulance bars being determined by the equation:

$$N = \text{int}\ \{2\pi R_i/[4\pi (R_i\ \delta)^{1/2} + W]\ \}$$

in which:

N= said number of turbulance bars in said dryer shell;

int= an integer number of a value in {} brackets;

$\pi = 3.1415$;

R_i = said inside radius of said inner surface of said dryer shell in inches;

δ = an average depth of said layer in inches;

W= a width of each of said turbulance bars in inches.

2. A dryer bar apparatus as set forth in claim 1 wherein

said number of turbulance bars is equal to $N \pm 1$.

3. A dryer bar apparatus as set forth in claim 1 wherein

said number of turbulance bars is equal to $N \pm 2$.

4. A dryer bar apparatus as set forth in claim 3 further including:

a further number of hoop segments spaced circumferentially along said inner surface of said dryer shell for holding said turbulance bars in contact with said inner surface;

said number of turbulance bars being a multiple of said further number of hoop segments.

5. A dryer bar apparatus as set forth in claim 1 wherein

$N = 3$.

6. A dryer bar apparatus as set forth in claim 1 wherein

$N = 4$.

7. A dryer bar apparatus as set forth in claim 1 wherein

N = 5.

8. A dryer bar apparatus as set forth in claim 1 wherein

N = 6.

9. A dryer bar apparatus as set forth in claim 1 wherein

N = 7.

10. A dryer bar apparatus as set forth in claim 1 wherein

N = 8.

11. A dryer bar apparatus as set forth in claim 1 wherein

N = 9.

12. A dryer bar apparatus of a dryer for drying a web in a papermaking machine, said apparatus comprising:

a rotatable dryer shell of cylindrical configuration, said shell defining and outer and an inner surface;

a number of dryer bars pressed outwardly against said inner surface, each of said bars extending in a cross machine direction along said inner surface; and

each bar being spaced from an adjacent bar by a quarter-resonant spacing such that a rate of heat transfer through said dryer shell from said inner to said outer surface is minimized while optimizing a temperature uniformity in said cross machine direction.

13. A dryer bar apparatus as set forth in claim 12 wherein

said quarter-resonant spacing is determined by an equation:

$S=4\pi(R_i\delta)^{1/2}$ in which;

S= said quarter-resonant spacing;

$\pi = 3.1415$;

R_i = said inside radius of said inner surface of said dryer shell in inches;

δ = an average depth of a layer of condensed steam disposed adjacent to said inner surface in inches.

14. An apparatus as set forth in claim 12 wherein

a cross-section of each of said bars is within a range from 0.25 inches x 0.25 inches to 1.0 inches x 1.50 inches;

each of said bars is metallic and of hollow tubular configuration;

said apparatus including:

at least one hoop for pressing each of said bars against said inner surface of said dryer shell;

said at least one hoop including:

at least one segment.

15. An apparatus as set forth in claim 14 wherein

said at least one hoop includes:

a number of segments within a range 2 to 4, each segment having a first and a second end;

a segment fastener disposed between said first and a second end of an adjacent segment for forcing adjacent segments apart;

each fastener being threaded on one of said ends thereof;

each of said hoop segments defining a hole in each end thereof, for engagement with a segment fasteners;

each of said segment fasteners having a head that passes through said hole in said end of said segment;

a hexagonal socket head defined by said fastener for permitting tightening of said fastener by a power tool;

a cylindrical pin for connecting each of said bars to an adjacent segment.

16. An apparatus as set forth in claim 15 wherein

said pin has an interference boss to hold said pin in said segment;

said pin having a shoulder to prevent said pin from coming out of said segment, said pin extending far enough out of said segment and into said bar so that disengagement of said pin from said segment is prevented.

17. A method of improving a cross-machine directional heat transfer profile of a papermaking dryer cylinder, said method comprising the steps of:

holding a number of bars axially against an inside surface of the dryer cylinder, said number being within a range 3 to 9; and

locating hoop segments within the dryer cylinder such that each segment is disposed in a

generally circumferential position.

18. A method as set forth in claim 17 wherein

the number of bars is 3.

19. A method as set forth in claim 17 wherein

the number of bars is 4.

20. A method as set forth in claim 17 wherein

the number of bars is 5.

21. A method as set forth in claim 17 wherein

the number of bars is 6.

22. A method as set forth in claim 17 wherein

the number of bars is 7.

23. A method as set forth in claim 17 wherein

the number of bars is 8.

24. A method as set forth in claim 17 wherein

the number of bars is 9.